DEVELOPMENT AND TESTING OF A STREAM SITE CLASSIFICATION FOR MISSISSIPPI

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Biographical Sketch of Authors

David Bressler is an aquatic ecologist at Tetra Tech, Inc., and has worked for approximately three years on projects developing biological indicators. In particular, he has been involved in designing studies, performing fieldwork, managing data entry and QC, and performing statistical analyses of data quality and overall ecological assessments of streams and watersheds. He is the technical lead on the Mississippi Department of Environmental Quality (DEQ) project developing and calibrating a statewide benthic index of biological integrity. James Stribling is an aquatic ecologist and Associate Director at Tetra Tech, Inc. He has worked for approximately 15 years in the field of pollution ecology, and specializes in monitoring program design, ecological data QA/QC, and application of assessment results to water resource management decisionmaking. Matt Hicks is an aquatic ecologist with the Mississippi DEQ Water Quality Assessment Branch, and is the agency technical lead and overall Project Manager for their IBI project. He is an aquatic entomologist by training, and has worked for over three years to help elevate QA/QC expectations of the agency, and to establish the use of biological indicators for making natural resource management and regulatory decisions.

Abstract

Multimetric indices are increasingly being used for assessing impairment of waterbodies, implementing management activities, and developing restoration and remediation strategies according to Section 303(d) of the Clean Water Act. Proper functioning of a multimetric index depends on being able to compare study stream conditions to natural stream conditions, while accounting for natural variability among streams. In areas such as Mississippi, where study streams are located in several ecoregions and natural stream physical, chemical, and biological conditions are variable, developing a site classification to partition this variability is critical to improving the accuracy and precision of stream assessments. We developed a site classification based on data from approximately 475 sites distributed throughout Mississippi (except the Alluvial Plain [Delta]). Benthic macroinvertebrate assemblage data from reference and sub-reference sites, selected according to quantitative physical, chemical, and land use/land cover criteria, were used in developing the potential site classes. Modified EPA level 3 and 4 ecoregions, geographical proximity, elevation, slope, and local factors (e.g., stream size, substrate, habitat, and chemistry) were all used as potential bases for site classification. Multivariate analyses, including Nonmetric Multidimensional Scaling [NMDS] and Principal Component Analysis [PCA], were used to assess the strength of each classification scheme. The classification that was best able to partition variability was selected as the geographic framework upon which further analysis and index development would be based.